

- 1 (30 points) Find the following indefinite integrals. Show all work necessary for the method you are using. (10 points each)

(a)  $\int \left( \frac{5}{x} + 10 \cos(2x) \right) dx$       (b)  $\int 8xe^{2x} dx$       (c)  $\int 8xe^{x^2} dx$

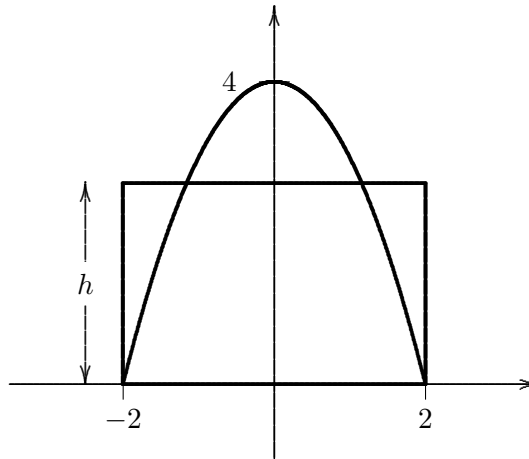
- 2 (15 points) The value of a certain computer system is changing at the rate of

$$V'(t) = -3200(7 + 6t - t^2) \quad 0 \leq t \leq 7.$$

- (a) (8 points) How much does the value change during the first three years?
- (b) (7 points) If the computer system was originally worth \$1,200,000, how much is it worth after the first five years?

- 3 (15 points)

- (a) (10 points) Suppose the area bounded by the curve  $f(x) = 4 - x^2$  and the  $x$ -axis is the same as the area of the rectangle shown below:



Find the height  $h$  of the rectangle.

- (b) (5 points) Suppose  $\int_1^3 g(x) dx = 10$ . Without knowing anything else about  $g(x)$ , determine the average value of  $g(x)$  on the interval  $[1, 3]$ .

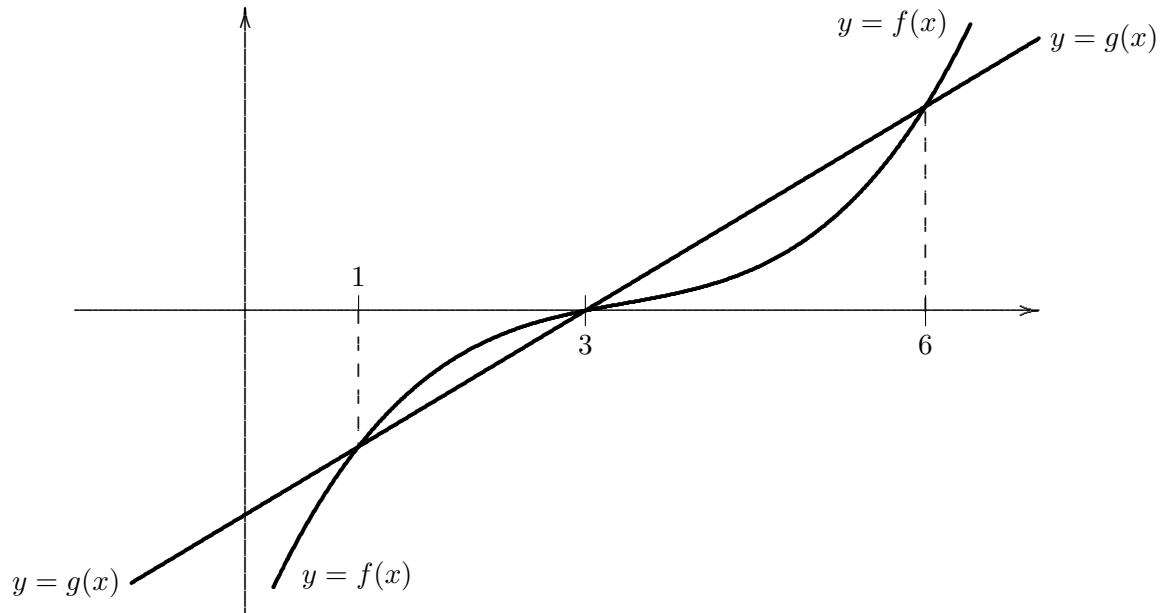
- 4 (10 points) The marginal cost function for producing  $x$  units of a product is

$$C'(x) = 200 - 100x^{-0.1}.$$

Find the increase in total cost if production increases from 100 to 150 units.

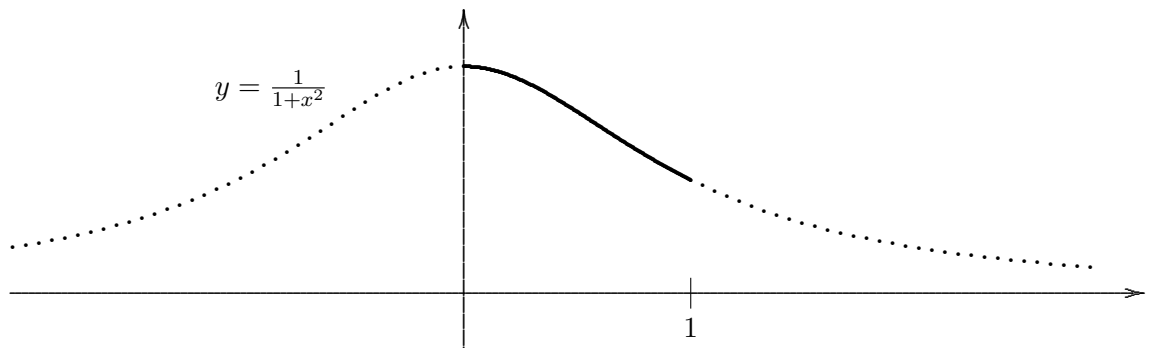
5 (20 points)

- (a) (10 points) Find the area bounded by the parabola  $y = 2 - x^2$  and the straight line  $y = -x$ .
- (b) (10 points) The figure below shows the graphs of two functions,  $y = f(x)$  and  $y = g(x)$ . Write an expression that represents the area bounded between these two curves.



6 (10 points)

- (a) (7 points) Approximate the integral  $\int_0^1 \frac{1}{1+x^2} dx$  by partitioning the interval  $[0, 1]$  into four subintervals of equal length and choosing  $u$  as the left endpoint of each subinterval. Here is a graph of the function over the appropriate interval:



- (b) (3 points) Is your estimate in part (a) higher or lower than the actual value of the integral? Explain how you know this without knowing the actual value of the integral.